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$MA = \frac{F_{out}}{F_{in}}$ $IMA = \frac{S_{in}}{S_{out}}$

$W = Fs$ ← in same direction

$IMA = \frac{20}{5} = 4 = \frac{F_{out}}{IF_{in}}$

$IF_{in} = \frac{1000N}{4} = 250N$

b) $300 - 250 = 50N$

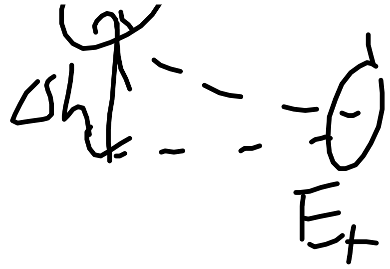
c) $1000N \times 5m = 5000J$

d) $W_{in} = F_{in} S_{in} = 300N \times 20m$

$= 6000J$

e) $\frac{1000N}{300N} = 3.3$

Q24 $F_y = 420N$



$h_1 = 0.40$

$h_2 = 1.00\ m$

a) $v = ?$ $\quad mg\Delta h = \frac{1}{2}mv^2$

$$E_{T_i} = E_{T_f}$$

$$mgh_2 + E_{k_i} \rightarrow 0 = mgh_1 + \frac{1}{2}mv^2$$

$$v = \sqrt{2(9.81)(0.6)}$$

$$\boxed{v = 3.4\ m/s}$$

b) $\quad E_{T_i} = E_{T_f}$

$$E_{g_i} + E_{k_i} = E_{g_f} + E_{k_f} + E_{lost}$$

* $m = \frac{F_g}{g} = \frac{420\ N}{9.81\ N/kg} = \underline{42.81\ kg}$

$$mgh_2 + 0 = mgh_1 + \frac{1}{2}mv^2 + E_{lost}$$

$$42.81(9.81)(1.00 - 0.40) - \frac{1}{2}(42.81)(2)^2 = E_{lost}$$

$$E_{lost} = 251.98\,J - 85.62\,J$$

$$= 166\,J$$

$$1.7 \times 10^2\,J$$

Define - Internal Energy

Thermal Energy

Heat

Temperature

Pressure

mole

Boltzman's Constant

Quiz

a) $F_g = mg$ $\quad m = \frac{F_g}{g} = \frac{50.0N}{9.81N/kg}$

$m = 5.10kg$

b) $W = Fs = 50.0N \times 4.0m = 200J$

↑ up

c) $-200J$

d) $s_{up\,down} = 0$ so $W = 0$

e) $P = \frac{W}{t} = \frac{60kg \times 9.81N/kg \times 4m + 200J}{5s}$

$= 5.1 \times 10^2 W$

f) $IMA = \frac{s_{in}}{s_{out}} = 2 = \frac{s_{in}}{4.0m}$

$S_{in} = 8.0m$

g) $2 = \frac{F_{out}}{IF_{in}}$ $IF_{in} = \frac{50N}{2}$

$= 25N$

h) $MA = \frac{F_{out}}{F_{in}} = \frac{50N}{30N} = 1.7$

I) $Eff = \frac{W_{out}}{W_{in}} = \frac{50N \times 4m}{30N \times 8m} \times 100\%$

$= 83\%$

2 a) $E_K = \frac{1}{2}mv^2 = \frac{1}{2}(19.5kg)(2.0m/s)^2$

$= 39J$

b) $W = \Delta E_K = 0 - E_{Ki} = -39J$

c) $W = Fs$ $F = \frac{-39J}{44m}$

$F = -0.89N$

$$F_f = -0.89\ N$$

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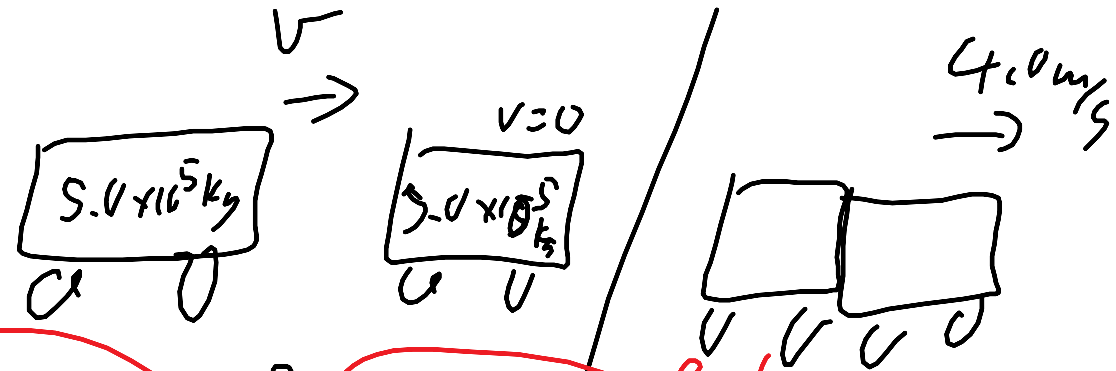
Q29



After

$p = mv$
$= 5.0 \times 10^5\ kg \times 2 \times 4.0\ m/s$
$= 4 \times 10^6\ kg\,m/s$

Before

$p = mv$
$= 5.0 \times 10^5 \times 8.0\ m/s$
$= 4 \times 10^6\ kg\,m/s$

Before

$ke = \frac{1}{2}mv^2$
$= \frac{1}{2} \times 5.0 \times 10^5 \times (8.0)^2$
$= 32 \times 5.0 \times 10^5$
$= 1.6 \times 10^7\ J$

After

$\frac{1}{2}mv^2$
$= \frac{1}{2}(5.0 \times 10^5\ kg$
$\times 4^2$
$= 8 \times 10^6\ J$

$1.6 \times 10^7 - 8 \times 10^6$
$= 8 \times 10^6\ J$